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which are liable to come from the overlapping of responsibilities and the confusion of purposes can be obviated. Better modes of appropriating money can be devised, and better assurances can be given that those who devote themselves to the government service shall not be inconsiderately superseded. But we doubt whether any system will be adopted which will secure the services of an abler corps, or, on the whole, a more faithful corps, than that which has superintended and directed the governmental work in science during the last twenty or thirty years. Any country may well be proud of the investigations in geology, in geodesy, in geography, in astronomy, in meteorology, in natural history, and in ethnology, which have been performed within that period by a staff of civilians; and to all their achievements must be added the scientific researches and studies of the able officers in the army and navy.

Whatever measures may be adopted with respect to re-organization, one principle should constantly be borne in mind. Science cannot be carried forward by prescribing too definitely the tasks of scientific men. They may be bound by appointed days and hours; they may be told to perform specific duties, — and if only the maintenance of routine work is required, such regulations may secure fidelity and efficiency. But if knowledge is to be advanced, if better methods of work are to be discovered, if greater accuracy is desired, if unknown facts are to be ascertained and recorded and discussed, and, in short, if there is to be real progress, the methods of freedom are to be employed, not those of petty regulation. By this we mean that if the great undertakings which the government has in charge, if especially its surveys of the coast and of the interior, are to go forward, discretion must be given to the chiefs of bureau, and they must be held to accountability for the aggregate success of their work. Honesty, economy, clear and accurate statement of accounts, are, of course, to be demanded in every office: nobody questions this. But the determination of what shall be undertaken in a given year, to whom it shall be assigned, what allowances shall be made for instruments, books, and assistants, — these are questions which experience and judgment must decide. Somebody who has all the facts in mind must make the determination, and he must not be too quickly condemned, because the immediate results of the investigations which he has undertaken are not yet apparent. The highest personal char-

acter should be found in every one who is called upon to direct the labors of a scientific corps; he should be faithful, watchful, careful that all the interests intrusted to him may be promoted; but he should be free within the limitations of his office to select his subordinates, determine their duties, and prescribe their methods. Only by such regulated freedom as this can the highest results be obtained. Discretion with responsibility, in all the higher work of science, will bring the best services from those whose moral attitude is what it should be: no others should be intrusted with the leadership.

THE MEETING OF THE AMERICAN PUBLIC HEALTH ASSOCIATION.

AFTER the paper of Dr. Hunt at the morning session, Tuesday, Dec. 8. (*Science*, Dec. 11), there was presented a paper on forms of tables for vital statistics, by Dr. J. S. Billings. Attention was called to the diverse forms in use throughout this country and Europe, and to the difficulties of drawing valuable deductions from a comparison due to this diversity. The health officer of a city desires information of the diseases which are liable to become epidemic, as to their location, relation to nuisances in the neighborhood, etc., in order that he may know where sanitary work is most needed. For this purpose tables are prepared which are made the basis of his study. These tables are published in the forms of bulletins or reports. Of these there are three principal forms: the weekly, the monthly, and the annual. As ordinarily issued, the weekly bulletin is too elaborate: its proper office is that of warning. If delayed, as it must be if complete and perfect statistics are to be recorded in it, its very object is thwarted, and its warning voice is not heard until after the need for it has passed. The annual form should be complete, and any reasonable delay in its issue to accomplish this is no detriment. The weekly bulletins issued by boards of health have too much the character of an annual report. It should constantly be borne in mind that they are designed for the information of the people: their main purpose is educational. They should state the total deaths, by color, sex, age, and locality; also those for certain diseases, as phthisis, pneumonia, cholera, yellow-fever, and diphtheria. In this form the unit of area is political usually, as by wards. This ward division could oftentimes with advantage be abandoned, and some other unit substituted. It is sometimes very important to have the mortality recorded by blocks, and the deaths which occur in a single tenement-house may not

infrequently be made the subject of special mention in a published report, with great advantage to the public health. The forms of cities, both American and European, were referred to as showing their great diversity. It would be better for the health officer to study the returns, and then publish through the secular press his deductions and observations. This could be done promptly, and would be of great benefit. There could then be issued a monthly bulletin, which could be made as complete as was desirable, and these monthly tables together would form the annual report. In the weekly statement to the public there should be no concealment: it should be frank and full as to the existence of communicable disease. Business interests should not be permitted to stand in the way of a free statement as to the existence of diseases liable to become epidemic, as by so doing time for preparation and protection by neighboring localities would be lost. The graphic form, as by diagram, was heartily commended as a means of education of the people, showing at a glance facts which would otherwise require hours of study. It was suggested that there be a conference of public officials having in charge these matters of vital statistics, to devise a plan by which there might be greater uniformity in the forms of tables and reports. Subsequently a committee was appointed, with Dr. Billings as chairman, to present to the association, at its next meeting, forms for the weekly, monthly, and annual bulletins.

In a paper on the relations of rainfall and water-supply to cholera, Dr. Henry B. Baker, secretary of the state board of health, Lansing, Mich., showed that the best plan to study cholera is in its home, and that if we can find any means by which its ravages have been diminished there, we may reasonably infer that the same measures adopted here will produce a similar result. With this object the history of cholera has been studied in India, with the most striking results. Six tables and diagrams have been prepared to make the subject more intelligible. Prior to 1869 surface or tank water was in use in Calcutta. During the five years 1865-69 the average deaths were 4,388 annually, in 1866 being 6,826, and in 1867, 2,270. In the year 1869 provision was made for a supply of filtered water, and in 1870 a most remarkable change was noted; the deaths in that year from cholera being only 1,558, and in 1871 falling to 796. Since 1870 there has been a marked reduction, estimated at 3,000 per annum. It was also demonstrated that during the seasons of the year when there was little rain the mortality increased, and that when the rainfall was most abundant the disease declined, even in the hottest

weather. During the heated period there were 300,000 more gallons of water sent into the city, and consequently less of the tank-water used, and just in that proportion was the mortality diminished. The year 1880 was remarkable for its low mortality, there being in that year but 805 deaths. The rainfall for that year was six inches greater than the mean for forty-eight years. In the suburbs the same improvement has not been noticed. This is explained by the fact that the tank-water is still in use there. A sewerage system was devised for Calcutta in 1859, to cost \$4,000,000. Thus far \$3,100,000 have been expended. The following deductions may be drawn: 1. The mortality for cholera has been reduced two-thirds by the introduction of filtered water. 2. Both before and since its introduction the rainfall has exercised an important influence on the mortality. 3. If the disease has been reduced two-thirds through the improved water-supply, and if one-third depends upon the amount of rainfall, this latter might be still further reduced by increasing still more the supply of good water, so as to make the people independent of the tank-water. 4. If in the home of cholera these agents have produced such beneficial results, we have every reason to believe that similar results would follow a like course pursued elsewhere.

'The virus of hog cholera,' was the title of a paper by D. E. Salmon, D.V.S., Washington, D.C. Of all the diseases which affect animals in this country, none is more destructive than hog cholera. During the present year it has been unusually prevalent, having appeared in almost every state in the union. It has caused a loss of thirty million dollars. While it has never been shown that it is communicable to man, yet indirectly he is affected in other than financial ways. What becomes of the millions of carcasses of the animals succumbing to the disease? Large numbers are thrown into ponds and streams from which drinking-water is obtained, there to putrefy; others are converted into lard; while but a very small proportion are burned or buried. Oftentimes, when these animals first show symptoms of sickness, they are despatched as quickly as possible to market, and there slaughtered, and their meat put up by the packers. The effect of such meat upon the health of human beings is uncertain.

The questions connected with the virus of this disease are exceedingly interesting. The entire subject of contagion is very much elucidated by its consideration. Anthrax is an endemic or enzootic disease, rather than an epidemic or epizootic. Fowl cholera is not limited by area or soil, but is not disseminated to a distance: it must be taken in the food or inoculated. Hog cholera, on the other

hand, is disseminated through the air to a considerable distance : some claim that this may be as much as half a mile, but this is probably exaggerated. The disease known in France as 'rouget' is supposed by some to be identical with our swine plague or hog cholera. Its virus is a long and slender bacillus. Pasteur's vaccine contains this bacillus, and not the figure-of-eight form which he first described. The 'rothlauf' of Germany is characterized by a fine bacillus, apparently identical with that of Pasteur's vaccine. In rothlauf the period of incubation is shorter than in swine plague; and another difference is absence of ulceration of intestine. The author inoculated four hogs with Pasteur's vaccine : one died ; the three others survived, but, when they were subsequently exposed to our hog cholera, they contracted it, and died. It is evident, therefore, that the rouget of the French, and the hog cholera of the United States, are different diseases, and that to introduce into this country general vaccination with Pasteur's vaccine would not protect our swine against cholera, but would introduce a new disease, and result in great loss and injury.

In the discussion which followed, Dr. Salmon stated, that, in his opinion, the virulence of the disease did not depend in any great measure upon the sanitary conditions with which the animals were surrounded. It was as fatal at the experimental station in Washington, where the most rigid cleanliness was practised, as elsewhere.

At the evening session on Dec. 8, Dr. James E. Reeves, the president, delivered the annual address. He especially called attention to some glaring deficiencies in the national organization. Congress had made no provision for the study of the causation of diseases that carried off tens of thousands of the people every year, and to-day we are compelled to submit to the mortification of having our children taken to Paris, where a Frenchman, Pasteur, has the only means which can save their lives. His address was an earnest plea for help to establish such a biological laboratory as the country could take pride in, for the investigation of human diseases with reference to their causation and prevention. He also deprecated the weakened condition in which the National board of health had been placed by the withdrawal of funds.

An account of the small-pox in Canada, and the methods of dealing with it in the different provinces, was given by Dr. P. H. Bryce, secretary of the Provincial board of health, Toronto, Ontario. In 1884 the town of Hungerford was visited by small-pox. Before a knowledge of its existence there was obtained by the board of health, one hundred and fifty persons were attacked ; and yet

so vigorous were the methods adopted to control it, that within two weeks the last case occurred. In April of the present year two cases occurred in Montreal : one was taken to a house in the city, and gave no further trouble ; the other was removed to a general hospital, the Hôtel Dieu, and soon there were nineteen cases, of which seven were fatal. From this the disease spread, so that in April there were 6 deaths ; in May, 10 ; in June, 13 ; July, 46 ; August, 239 ; September, 660 ; October, 1,391 ; November, 633. In all, thus far, there have been three thousand deaths, in about five hundred different houses. From the city it spread to the suburbs, where it is now prevalent. In order to prevent the introduction of the disease into Ontario, the board of health of that province sent inspectors into Montreal, and every passenger and his baggage were inspected before they passed the boundary-line between the provinces. Rags were prohibited under all circumstances, and other goods were admitted only when accompanied by the certificates of these inspectors that they were not infected. Vaccination of all unprotected persons was enforced. Although the disease was so prevalent in all the eastern parts of Canada, yet but fifteen cases have occurred in the entire province of Ontario, and not one case from infected baggage, merchandise, or clothing,—a far less number than have occurred in the city of New York in the same period, distant as it is from the centre of infection. One case had been traced to a letter.

Dr. Hingston of Montreal explained at some length the difficulties which the health officials had had in their attempts to stamp out the disease in that city. Some thirteen years ago anti-vaccination documents began to be circulated in the French language, and this has continued ever since. Every vaccination followed by any inflammatory trouble was denounced as an outrage, the inflammation denominated erysipelas, and the child declared to be poisoned. As a result of this agitation, but few of the French Canadians born during the past thirteen years were vaccinated, and it was among them that small-pox has found its victims.

'Impure air and unhealthy occupations as predisposing causes of pulmonary consumption,' was the title of a paper by Dr. C. W. Chancellor, secretary of the State board of health, Maryland. Consumption causes one-fifth of all the deaths in England, one-sixth in France, one-seventh in Germany and Austria, and one-eighth in the United States. In 1880 the total deaths in this country from all diseases was 756,893. Impure air in rooms where tailors and seamstresses worked all day, with closed windows and no means of venti-

lation, resulted in consumption in these people. In the country, consumption prevails in damp valleys and along the banks of rivers. In the city we find it most prevalent in those whose habits are sedentary, as book-keepers, clerks, salesmen, etc. It is also prevalent among file-makers, steel-workers, grindstone-makers. In the latter class, hardly one escapes. In the discussion of this paper, it came out that the mortality from consumption was greater in the District of Columbia, in proportion to its population, than in all of New England; and that whenever it occurred it was largely acquired, probably seventy-five per cent. In fact, some, Dr. Didama of Syracuse among the number, believed that it was always acquired, and never hereditary.

The evening session of Dec. 9 was opened by the reading of a paper on 'The German system of physical education,' by Dr. E. M. Hartwell, Johns Hopkins university, Baltimore.

Physical training had its origin in Germany in 1785. At present the time devoted to this part of the education must be at least two hours weekly. The effect on the development of the German youth can be imagined when it is considered that this systematic physical training continues from the age of six years to the age of eighteen in girls, and twenty in boys.

A full list of the papers was given in *Science* of Nov. 20.

The Lomb prizes were awarded as follows:—

1°. 'Healthy homes and foods for the working classes.' First prize not awarded; second, to Victor C. Vaughan, Ann Arbor, Mich.

2°. 'Sanitary conditions and necessities of school-houses and school-life.' First prize not awarded; second, to D. F. Lincoln, M.D., Boston, Mass.

3°. 'Disinfection and individual prophylaxis against infectious diseases.' First prize, to George M. Sternberg, M.D., surgeon U.S.A.; second not awarded.

4°. "The preventable causes of disease, injury, and death in American manufactories and workshops, and the best means and appliances for preventing and avoiding them." First prize not awarded; second, to George H. Ireland, Springfield, Mass.

Reports of committees on school hygiene, animal diseases and animal foods, and on disposal of the dead, were made by their respective chairmen. The latter was a *résumé* of what had been accomplished during the past year in the advancement of cremation. The 4,380 human bodies which are dissected annually in Paris at the medical school are now cremated in the cemetery of Père la Chaise. In Italy there were, during the year 1884,

396 bodies incinerated. In Spain a bill has become law, granting permission to cremate human bodies. In Germany, in 1884, 186 bodies were similarly disposed of. During the present year four persons have been cremated in England, and there is now no question there of the legality of this process. The agitation of the question has aroused the Church of England, and important reforms have been instituted in the methods of burial. One of these is the substitution, for the usual coffins, of those made from pulp or *papier-maché*, which will readily disintegrate. In France a bill is now in the chamber of deputies, legalizing cremation, and an engineer has been sent to Italy to study the best plans for a crematorium, to be built near Paris. During 1884 six societies for the advancement of cremation have been established in the United States, and two crematories erected.

Mr. Lomb offered new prizes for another year, one for plans for constructing houses costing \$600, \$1,000, and \$1,500; the amounts to be \$100 for the first, \$75 for the second, \$50 for the third, and \$25 for the fourth.

The following officers were elected for the ensuing year: president, Dr. H. P. Walcott, Cambridge, Mass.; first vice-president, Dr. C. W. Covernton, Toronto, Canada; second vice-president, Dr. G. B. Thornton, Memphis, Tenn.; treasurer, Dr. J. Berrien Lindsley, Nashville, Tenn. The secretary, Dr. Irving A. Watson, was elected in 1883 for three years.

It was decided to hold the next meeting at Toronto, Canada, commencing on the first Tuesday in October.

METHODS OF TEACHING POLITICAL ECONOMY.

PROFESSOR LAUGHLIN opens the work which we have under consideration with these words: "The existence of this little book is due to an attempt to convey by lectures to students an understanding of the position which political economy holds in regard, not merely to its actual usefulness for every citizen, but to its disciplinary powers, and to the qualities of mind which are necessary for success in the study."

The author's treatment of methods, based as it is upon an experience of several years in the class-room, is valuable both on account of its positive information and its suggestiveness. It may be well, in particular, to call attention to those pages in which Professor Laughlin describes the advan-

The study of political economy. Hints to students and teachers. By J. LAWRENCE LAUGHLIN, Ph.D., assistant professor of political economy in Harvard university. New York, Appleton, 1885. 12°.